The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Annual Meeting.

SECOND DAY, AUGUST 26TH, 1913.

The Delegates met at the Mayo Hall, at 11 a.m., and sat till 5-30 p.m. The whole day was spent in discussing the Labour Question, the speeches on which will appear in full in the Book of Proceedings.

THIRD DAY, AUGUST 27TH, 1913.

A joint lecture by Messrs. R. D. Anstead and C. K. Pittock dealing with the composition of the Coffee Berry and the manuring of Coffee estates was delivered. This lecture is published in full in this issue.

The subject of Pests and Diseases provided an interesting discussion upon the outbreak of Green Bug in Mysore and Coorg and the methods of dealing with it. Dr. Coleman, Mr. Bainbrigge Fletcher, and Mr. Chadwick, the Director of Agriculture, took part in this discussion and finally the following resolution was passed :—

"In view of the presence of Green Bug on coffee estates in South India, it appears essential to this Meeting that the Government should introduce some form of internal Pest Act in order to strengthen the hands of their scientific staff, who may be employed for the stamping out of pest and keeping it under control, but would suggest that if any general Pest Act became law, its provision should be submitted to the U. P. Association for consideration and report."

MR. BAINBRIGGE FLETCHER.

Mr Bainbrigge Fletcher, the Imperial Entomologist, said that when he had visited Mysore and Coorg it was before the outbreak of this scale, and as far as he was able to see there was no scale there at the time. He had, however, since seen the scale on the Shevaroys and Anamalais. On the Shevaroys he believed it had been in existence for the last ten years, but had apparently done little damage. On the Anamalais it was very bad on the northern slope. On the Nilgiris, he had not seen it to any extent, but they all knew, and the planters knew better than he, how much damage it had done there. He believed that in some parts it had gone so far as to wipe out the coffee completely. In Ceylon the scale was introduced about forty or fifty years ago when coffee was the staple industry. It was believed to have been brought in from Brazil. It was one of those pests which had been brought in from outside countries, and those pests did the

greatest amount of damage, because they came in by themselves without bringing their parasites and natural enemies with them, and thus were able to live and increase under abnormal conditions. The rate at which these insects were able to multiply was something one could hardly realise. Taking for an example an insect which laid 200 eggs and went through its stages in one month, which was a very average rate of increase and time. If on the 1st January such an insect laid 200 eggs, by the end of the year they would find that from that one insect over two trillions of insects had come into existence. They could not realise what an enormous quantity those figures represented, so he would try and give them an illustration. If 1,000 of these insects occupied a space of a cubic inch, two trillions would cover the whole land surface of the world to a depth of 80 ft. Again, taking 1,000 to the cubic inch, put all together in one mass, two trillions would occupy a space of seven million cubic miles, or a cube which measured 200 miles on each edge. Fortunately, no insect in this world multiplied at this rate, because it had to fight so many enemies in the course of its existence. In the case of an insect brought in new to the country, it escaped to a large extent these enemies. For this reason it was that these introduced pests were so important. Therefore, when a pest like the Green Bug was brought into the country, it found as much food as it required and could and did multiply at an enormous rate without restraint. In the case of the Green Bug there were very few parasites that preyed on it. There was a fungus which attacked it in the wetter time of the year, but they could not rely on fungus to keep this scale wholly in check, as during the dry season the fungus could not spread while the scale went on increasing and extracting moisture from the plants at a time of the year when moisture was most deficient in the soil. For the control of this particular scale it was important and actually essential that outside measures should be taken, such as spraying or brushing, or any other practical measure which might be suited to particular local conditions. There was a good but homely old saying, that there were more ways of killing a cat than choking it with cream, and that is applicable to insect pests. No general rule could be laid down to deal with all pests; they had to take measures which were applicable to particular local conditions. In the present case he would say from what he had seen of the scale and from his experience in other countries, where scale were serious pests, that spraying was probably the best method of controlling this scale. In those districts which the scale had recently invaded, the planters of the estates attacked, and those estates which were not attacked, should take up the question of spraying seriously, and do their best to keep the scale under control before it got bad. That might secure a certain measure of success; otherwise if the scale got in in really large numbers, covering the whole area, it would get out of hand, and it would be a very serious business, indeed. They could not tell whether it would assume the same destructive proportions in Coorg and Mysore. The damage done seemed to depend on conditions which were not yet understood. In the Shevaroys the damage was very slight, although the scale was well distributed throughout the Ditrict. In other districts the damage had been very severe. Whether the damage would be severe or slight in Mysore and Coorg one could not foretell. It would be much better to try and keep the scale in check before it attained proportions in which it does damage than to wait and see whether it was doing damage when they could do nothing to check it.

DR. COLEMAN.

Dr. Coleman said that with regard to the question of prediction of the spread of new insect pests, he would give a short statement of a personal

experience in Mysore about four or five years ago. A new grass-hopper pest had been brought into the State *from Bombay*, which was seriously attacking the cholam and other cereal crops. The pest, the first time he came in contact with it, was very serious, and was scattered, over a wide area, but was not equally distributed, but, was found in isolated patches. For two years he studied the question and then published a bulletin in which he predicted, with some reservation, that the insect might be expected to spread over North Mysore, and might also be expected to extend its depredations to the ragi crop. He might say that his prediction was falsified, because he was unable to predict the weather conditions. The weather conditions in Mysore, for the past few years, had been peculiarly unfavourable to the increase of the insect. One of the essential factors for the spread of the pest is the necessary sap at the time the insect emerged, roughly, in July. Since the last serious attack in Mysore, there had, every year, been a failure of the early rains, and, therefore, a lack of food, with the result that the insects died in large numbers. Since then they had *appeared in small numbers, but he had not the slightest doubt that the* insect was still there, and when favourable conditions returned, they might expect the insect to spread. He was, therefore, in the same position as Mr. Fletcher was with regard to Green Bug, he did not know what was going to happen. The only safe thing to do was to take precautions to ensure being able to deal with the pest. He did not believe in a policy of "wait and see." They ought to take matters in hand before they got serious.

With regard to Green Bug he had little practical experience of the pest. He had seen it on a couple of estates in Munzerabad. When he saw the insect it was supposed to have gone. The fungus disease which certainly did attack the insect, had probably killed 90 per cent. of the scale. The spraying which had been done thoroughly on certain estates had also a marked effect. Nevertheless, it did not require a very long search to find that the scale was still present. Now with regard to what they were to do. It was perfectly clear they had a Scientific Department, and it was unnecessary for him to give them advice or to give them any assistance. (Cries of "No, no.") They were intelligent gentlemen with a knowledge of the country and the life history of the insect, and knew the means to take to check it, and that should be sufficient. He, on the other hand, had to deal with a large body of people who knew nothing about insect pests, who knew nothing about the control of insect pests, and who had a natural conservatism behind them with an additional incubus of a strong desire to let things rest as they were. The *problem he had to tackle was a good deal more difficult* than the problem that they had to tackle. On the other hand, he was quite well aware that the success of their portion of the task would depend largely on the portion of the work undertaken by the Mysore Agricultural Department and the support of the Mysore Government. Now, he was sure, speaking from his own standpoint, that they were quite alive to the seriousness of the position, and he was certain that the Mysore Government were alive to the seriousness of the position, and he thought that he could safely say that any reasonable proposal to deal with the pest would be favourably considered by the Government. What could they do to combat the danger? The first thing that he proposed to do, and that within a week's time, was to *examine into the question of the source of infection.* They knew that a theory had been advanced that the insect came in manure bags from the low country. He was not prepared to make any statement regarding this. Looked at without consideration, it seemed improbable, but very improbable things had happened before now. *It was important, however, that they should get* to the bottom of this matter. It had to do with areas not yet infected,

and if the insect was brought up in manure bags, it was very likely, indeed, that those areas would be infected in some way. In case this proved to be a fact measures could be taken to prevent a recurrence of the infection. He proposed, therefore, to put the best assistants to work on the Railway lines and along the main roads leading to the coffee estates to ascertain the villages from which the cartmen had come, and to search the material the cartmen carried to find if any infection was there at all. At present they knew that a certain number of estates had been infected. They knew of very few estates owned by Indian planters being infected. He had, no doubt, that quite a number of these were infected. What he proposed doing was to have a list of estates in Mysore where Green Bug was present, and he proposed to get a list of native holdings within a radius of three or four miles, and to put men on to search these holdings to see if they were infected. He hoped also to be able to turn into South Mysore something like forty sprayers within the next two or three weeks, and he proposed that all spraying work should be done under the supervision of the Mysore Agricultural Department. He believed in doing the work thoroughly.

One other point was the question of infestation of abandoned estates and the small patches of coffee round the houses of the ryots. That was a very serious question, and he would like to have the opinion of the Meeting as to how it could best be handled. As regards abandoned estates, he thought that it could be possible to remove the old coffee and root it up. He was not quite conversant with the conditions under which abandoned coffee was held. If the Government had resumed the land, it would have been returned to the Forest Department, and they could be dealt with in the way suggested. If they were in the hands of Indian owners, it would be more difficult, and it would be possible to work through the Revenue Department to put pressure on the men to get the coffee plants out.

To carry out the general campaign he proposed to proceed on the same lines as those adopted in the campaign against *koleroga*. He proposed to employ local men to work under the Mysore Agricultural Department for a certain number of months. These men would be chosen for their knowledge of local conditions in the *hobli* or taluq, and it would be their duty to report every week. Their work would be constantly inspected by the superior officers, and he would constantly inspect the work of the superior officer. He hoped that the work would be efficient. The plan had worked well in the case of *koleroga*, and he hoped that they would be able to do something on the same lines with regard to Green Bug. He would be glad of any suggestions from planters for combating the pest on Indian estates.

FOURTH DAY, AUGUST 28TH, 1913.

The Delegates met again at 11 a. m. and sat till past 5 O'clock. The Sub-Committee on Labour read their report which was unanimously adopted.

CEARA RUBBER.

Mr. Mahon made the following remarks on Ceara Rubber, which led to an interesting discussion, in the course of which Mr. Mahon kindly gave much useful and valuable information.

"I have several times been asked the question of 'How is Ceara likely to pay in Coorg?', so without making any lengthy speech on the matter, I should just like to say a few words with a view of getting more thoroughly into touch with those, who like myself, take an interest in this species of the Rubber industry, and thus endeavour to encourage a higher standard of working for our mutual benefit.

Many of you will have read Mr. Anstead's letter on this product in the *Chronicle*, written after a visit he paid to the Estates in Coorg that I have to do with. Here this gentleman ably describes our different methods of cultivation and tapping, together with his criticisms thereon, which hardly leave me room for further comment. I should however endorse his remarks as to the importance of giving the trees a thorough cultivation from the start. Many men have been content to plant large fields of Ceara, and then leave them more or less to struggle on, as best they can, amidst a jungle of grass and weed. I should say at once cultivate it properly or leave it alone. Much valuable land, money, and time have been wasted in the past in this respect. That Ceara will pay and pay well, if these conditions are carefully carried out, I am convinced of. We in Coorg have been treading our way up to date, carefully and cautiously, more towards finding out the best systems of tapping and curing, than of gaining any large result; also our endeavours have been directed towards discovering, on moderate lines, the best tappers, so that we can propogate from these trees for our benefit in the future and thus materially improve our selection.

Taking one of our Estates as as example of what we did this past season, we tapped approximately 19,260 trees an average of 40 times, which gave us 7,486½ lbs. of dry rnober or a little over ⅜ of a pound per tree, which we placed on the Market at a profit of 10½d. per pound, after covering every expense connected, from the season's cultivation down to the freight to London.

These 19,260 trees would be represented in about 170 acres, composed of approximately 115 tappable trees to the acre, six years old each. Of this I should compute quite another 40% per acre have yet to arrive at the tapping stage. The average yield per tree will go on steadily increasing and also the cost of manufacture will be considerably lessened now, by reason of our having established up-to-date machinery.

I shall further be glad to place anyone desirous of obtaining further information, in direct communication with certain of my Managers."

FIFTH DAY, AUGUST 29TH, 1913.

The Delegates met for the final session at 11 a. m. and sat till 2 p. m. and disposed of the remaining subjects on the agenda paper and the election of Office-bearers for the coming year, which resulted as follows:—

Chairman	...	...	...	Mr. E. L. Mahon.
Vice-Chairman	...	...	...	Mr. E. A. Hughes.
Vice-Chairman	...	...	...	Mr. W. L. Crawford.
Secretary	...	...	...	Mr. Norton.

The Hon'ble Mr. Barber proposed a vote of thanks to Mr. Abbott the retiring Chairman for the able manner in which he had conducted the affairs of the Association for the past two years. Mr. Abbott replied and declared the meeting closed.

Memo. of Resolutions.

WEIGHTS AND MEASURES.

1. "That this Association confirms its resolution of last year and again approaches the Government of India in the hope that the standardization of weights and measures may speedily become law."—Carried unanimously.

ARSIKERE-MANGALORE RAILWAY.

2. "That in a view of the material increase in the prosperity of all classes in the State of Mysore, the Province of Coorg and South Canara and

the great and ever increasing development of commerce, and the mineral resources of Mysore, and in view of the elaborate schemes now on foot for the economical development of the Provinces above-named, this Association considers that it is an opportune time to once again bring to the notice of the Government of India the necessity for the early construction of this most important line, forming, as it undobtedly does, the key-stone of any scheme of Railway Construction undertaken for the development of the Province of Mysore and only in a lesser degree Coorg, giving, as it would, direct communication with Mangalore, the natural port of Mysore and the West Coast, and seeing the Mysore Durbar are willing to construct their portion of the proposed line, this Association resolves to ask the Government of Madras to co-operate by urging upon the Government of India the necessity that exists for at once constructing the small and relatively inexpensive section that would have to be built in South Canara joining the Mysore and Coorg lines directly with Mangalore and the West Coast."—Carried.

THE THENI BRIDGE.

3. "That this Association call the attention of the Government of Madras to the continued delay in, and waste of money on, the construction of the Theni Bridge and the continued bad condition of the main road from Periakanal to Bodynayakanur and Kuruvanuth, and that such orders as may be necessary be issued to the Madura Local Board to ensure the speedy completion of the Bridge and getting and maintaining the road in really good order."—Carried unanimously.

YERCAUD FEEDER ROADS.

4. "That this Association do urge on the Government of Madras the necessity for completing the Manjivadi and Kilignr-Pattapadi cart roads and that, as the present Yercaud-Craigmore Feeder Road becomes absolutely impassable after heavy rains, owing to the clayey nature of the soil, this Association begs that Government will have the first five miles metalled." —Carried unanimously.

EUROPEAN DEFENCE ASSOCIATION.

5. "That this Association is strongly in sympathy with the objects of the European Defence Association and trusts that Honorary Secretaries of the affiliated Associations will do their utmost to bring them to the notice of planters and obtain their support." - Carried unanimously.

LONDON SCHOOL OF TROPICAL MEDICINE.

6. "That this Association notes with satisfaction the formation of an Endowment Fund for the purposes of the London School of Tropical Medicine and contributes a donation of £20 thereto and will circularize the affiliated Associations asking their financial support and ask the Government of Madras to approach the Government of India with a view to their contributing towards the £100,000 required."—Carried.

THE LABOUR PROBLEM.

7. "That this Association considering that recruiting has been abused to such an extent as to be detrimental not only to the best interests of the Planting Industry, but also of the Agricultural Labourers themselves, request the Government of Madras may take such steps as may be necessary to suppress the 'Professional Recruiter,' as defined below. 'The Professional Recruiter is an individual who collects coolies and sells them at any centre and afterwards ceases to have any further interest in their well-being, future, or whereabouts, as distinguished from the authorized Kangany or Maistry,'" —Carried.

A Labour Commission.

8. "That this Association accepts the recommendation of the Labour Committee to establish a Labour Commission of its own."—Carried unanimously.

9. "That this Association seeing the way in which advances are increasing and the disadvantages they suffer from this competition, not only with foreign countries but also amongst ourselves, urge on District Planters' Associations the desirability of curtailing as far as possible the amount of advances paid."—Carried.

10. "That this Association forwards to the Labour Agent of the Malay States at Madras and the Chairman of the Federated Malay States Planters' Association, copies of the vernacular letter, a translation of which was read at this meeting, with a request that they will deal it possible with the writer of this letter, and deprecates in the strongest possible way such action."—Carried.

Non-Service of Warrants.

11. "That this Association would call the attention of the Government of Madras to the fact that in spite of previous representations made upon this subject, a number of warrants taken out against absconding maistries and coolies, which are unexecuted remains very large and particularly in the Native State of Mysore and District of Coimbatore, and would ask them to urge upon the officials of these respective Districts that greater efforts be made to effect the service of warrants generally and further that we bring to the notice of the Mysore Durbar the fact that the local Courts having jurisdiction are treating non-bailable warrants as bailable warrants, resulting in the escape of the accused."—Carried unanimously

Pest and Pest Act.

12. "That in view of the presence of Green Bug on Coffee estates in S. India, it appears essential to this meeting that Government should introduce some form of internal Pest Act, in order to strengthen the hands of their Scientific Staff who may be employed for stamping out the pest and keeping it under control. But would suggest that before any general Pest Act became law, its provisions should be submitted to the U. P. Association for consideration and report."—Carried unanimously.

Fertilisers and Guarantees.

13. "That this Association approached the suppliers of fish manure pointing out that in view of the very large percentage of insoluble matter in some of the manure at present supplied by them, they should be asked to guarantee for the future that the members of the U. P. Association be asked to give preference to those firms who are prepared to give such guarantee compatible, of course, with no appreciable increase in cost."—Carried.

Report of Labour Committee.

14. "That this Association unanimously resolve that the Report and recommendations of the Committee be adopted and that Messrs. Barber, Abbott and Nicolls be elected as the Executive Committee to carry out the recommendations made."—Carried.

International Rubber Exhibition, 1914.

15. "That the United Planters' Association of Southern India strongly advise District Associations to support the International Rubber Exhibition of 1914 with a view to getting in closer touch with the manufacturer and the standardisation of rubber."—Carried unanimously.

THEFTS OF RUBBER.

16. "That in view of the increase in production of rubber, tea, pepper and cardamoms in S. India, Government be approached and asked to pass an enactment for the protection of these products from theft."—Carried (Resolution of 1910.)

"That is view of the increasing production of rubber in S. India the Planting Member of Council be asked to ascertain if the Government of Madras will bring in similar legislation to that passed in Travancore and contemplated in Cochin."—Carried unanimously.

ADULTERATION.

17. "That the Government be approached through the U. P. A. S. I. with the view to dealers in this country being restrained from selling coffee in tins, with a large percentage of cheap admixtures, under the name of pure coffee, without adding the percentage of adulteration." (Passed at last year's meeting and re-affirmed by the present meeting).

RETENTION OF THE SCIENTIFIC OFFICER.

18. "That the Nilgiri resolution, dated 16th July, 1913, regarding the Scientific Officer be adopted."

"That this Association strongly holds that the appointment of the Scientific Officer still be continued and that Mr. R. D. Anstead should continue to act as Scientific Officer. Were another Scientific Officer appointed, it would mean that it would take such Officer at least 2 years to get into touch with the needs of the various Districts. It is understood that the gross value of the exports of planting products from the Madras Presidency amounts to 242 lakhs, and in consideration of these figures the Government contribution of Rs.5,500 cannot be considered adequate."

A PROPOSED MYCOLOGIST.

19. "That this Association considers that the services of a Mycologist under the direct control of the U. P. A. S. I. is necessary. That there is a need for such an appointment is apparent from the subjoined list of diseases on which investigation is required, and that the Hon'ble Mr. Barber be asked to urge the matter on Government."—Carried.

IMPORT DUTIES.

20. "That this Association do approach the Government of India with a view to obtaining a remission of duty on all ingredients used as insecticides and germicides, such remission of duty only to be granted to approved firms importing these goods for *bona fide* agricultural purposes."—Carried unanimously.

CINCHONA.

21. "That Government be asked to give a definite declaration whether they intend to plant Cinchona or not, pointing out that this Association adheres to its former policy in opposing the planting of Cinchona by Government, and in view of the necessity of obtaining a cheap supply of quinine for the country, requests that Government will reconsider the advisability of encouraging planters to cultivate Cinchona, suggesting as a basis a 7 lb minimum and Government control of the acreage to be planted with this product in any one year."—Carried.

RAILWAY FREIGHT ON TEA SEED.

22. "That the United Planters' Association approach the Indian Tea Association asking them to use their influence to obtain concession in the rates of freight on Tea seed, from all railways in India."—Carried unanimously.

EXPORT DUTY ON BONES.

23. "That the Report of the Special Committee appointed to consider the question of the Export Duty on Bones be adopted together with their suggestions."—Carried.

CORRESPONDENCE.

The EDITOR, August 27th, 1913.

Planters' Chronicle.

The Labour Problem.

Sir,—Every word Mr. Danvers wrote last week was true. Those who want labour now must go on raising pay until they get it, and those who cannot afford to must go to the wall.

Legislation of any sort is futile, especially in Native States because of corruption which is always increasing, and which will do the same in British India as the control of affairs passes into other hands.

Mr. Danvers makes no suggestion as to how we planters may help the situation, and I can only think that extensions ought to be immediately curtailed. The U. P. A. S. I. might strenuously urge all its *members to open* up no more new land. The tea and rubber community in Ceylon, Malay and S. India have been able to make their conditions so attractive to coolies, that now in the recruiting areas wages are going up almost to the level of that offered in the planting districts, with the result that a further rise will be necessary.

My belief is that in a few years, when the existing acreage in tea and rubber reach the full productive stage, that wages will be double what they are now. Owing to the high price of food stuffs, the cooly is in much greater demand by the ryots, who are themselves extending their cultivation everywhere possible.

Yours faithfully,

(Signed) KITHOGUE.

Srivilliputtur,
27th August, 1913.

THE EDITOR,

The Planters' Chronicle.

Sir,—For some years I have been trying to say the very things that Mr. Danvers has said in his letter published in your issue of the 21st August—not having his gift of expression, my efforts have been scoffed at, as mere attempts to be funny; at any rate they appear to have made little impression beyond my own district, and perhaps in some others in Travancore, unless I can count Mr. Danvers as a convert? There are of course many others with whom I have seen eye to eye all along. Once upon a time Mr. Danvers did not like legislation, because he was afraid of it; now, he sees its futility; he also sees that Registration schemes (*et hoc genus omne*) deal only with mere excrescences. I do hope that the general body of planters will be convinced by his *cogent statements and able advocacy*. When planters as a body understand the bedrock position, there will be a chance of Unity. The shadow has hitherto been mistaken for the substance, by all those who look to Government legislation, finger prints, and schemes of registration as steps in the right direction—to my mind backward steps.

Yours faithfully,

(Signed) AYLMER FF. MARTIN.

The EDITOR,
The Planters' Chronicle,

Freights.

Dear Sir,—" Sleeping Brother " has been candid in his letter published in your issue of the 23rd instant.

The steamship Company named will I believe grant the rebate (which is apparently quoted as a precedent for a Planter's claim on the Coalition) to any individual shipper be he a " Firm " or " Constituent " and is doubtless merely a roundabout method of reducing rates of freight with a view to competing with the other Coasting Lines on the West Coast.

The direct Steamer Lines rates are usually, if not always, lower than the through rates *via* Bombay by the B. I. S. N. Co's Line, and for this the Coast firms might reasonably expect some consideration from constituents.

The Rebates paid—and which are legally and morally earned by the Coast Firms who are Members of the Coalition—are merely a small return for the trouble and risks, involved in arranging and providing for a regular and sufficient supply of direct tonnage for produce for shipment to London.

If the " younger generation" are groping about in the dark, and feel that the subject is one which demands more " up-to-date " scrutiny and enquiry, the U. P. A. S. I. might perhaps with advantage ask " Curers" for a repetition of their arguments and to state their case for the benefit of those who feel the "older generation," amongst whom were many men of sound commercial intelligence, have knuckled under to a gross and flagrant injustice

Finally I would mention, Mr. Graham has been favoured with some details on this antiquated subject, and this gentleman will doubtless give " Sleeping Brother" the benefit of some enlightenment on the position—as regards the Freight Rebates—of

(Signed) A. CURER.

Adderley Estate,
Coonoor P. O., 27th August, 1913.

The EDITOR,
Planters' Chronicle.

Green Bug.

Dear Sir,—It appears that the cost of spraying on this estate which I quoted as Rs.20-4-2 calls for some explanation.

I am willing to give full particulars of the cost of spraying the field I referred to.. To begin with Mr. Brown's supposition that the material cost Rs.5-8 per 1,000 is incorrect. The actual cost was Rs.13-7-10 or 70 tins of mixture at 3 annas 1 pie each. I employ one man and a boy to each sprayer for the reason mentioned in my last letter, these cost 6 annas 6 pies per 60 trees or Rs.6-12-4 per 1,000 trees, total cost per 1,000 Rs.20-4-2. I myself sprayed some trees last week with a heavy crop on them, as the task seemed short. It took me about 10 minutes to do one tree, going over every branch and getting the mixture well into the bunches of crop. They were large trees. The fields I referred to are planted 8' x 8' and have a good spread of foliage. I would like to mention that I used new " FOUR OAKS" sprayers for the above field. The total cost per acre for the whole Estate in season 1912 and 1913 was Rs.6-0-4. If the cost be calculated on an acreage basis, the figures I quoted in my letter of 16th July may be halved. Those fields contain about 500 trees per acre and the ground is well covered.

Yours faithfully,
(Signed) L. A. GERRARD ROGERS.

COFFEE.

The Varying Composition of the Coffee Berry at different stages of its growth and its relation to the Manuring of Coffee Estates.

By Rudolph D. Anstead, B. A., Planting Expert
and
C. K. Pittock, Esq.

PART I.

During the past three years we have been studying the manurial problem, as it affects Coffee, from a chemical standpoint with the object of trying to obtain some hint, not only as to the best proportions of plant food to give to this crop, but also at what time of year the plant food is best applied.

The first step was to investigate the composition of the Mulch obtained from the shade trees and the coffee itself and to determine its manurial value. This piece of work was carried out in 1912 and reported in detail in the *Planters' Chronicle* (Vol. VII, p. 238). We came to the conclusion that it was quite possible the Coffee where a heavy mulch was established was receiving an unbalanced ratio of plant food, the Nitrogen being in excess, and that the composition of the mulch should be taken into consideration when applying fertilisers. That conclusion is now being worked out by one of us in the field by means of experimental plots of known history.

The next step was to investigate the composition of the Pulp and to ascertain whether this waste product was of any practical value as a fertiliser, and, if so, how it could best be conserved as a compost with other estate refuse. The results of this work were reported at this Meeting last year and the investigation is being continued both in the laboratory and in the field with experimental plots.

The ground being thus cleared we next turned our attention to the actual chemical composition of the Coffee berry itself. When a chemical analysis of parchment coffee, or coffee berries, is critically examined one fact at once strikes one as being prominent. The following analyses are, (a) of the ripe fruit by Hughes; (b) of cured Mysore coffee by Lehmann; (c) of the ash of coffee beans by Wolff.

TABLE I.

Analyses of Coffee.

	a	*b*	*c*
Moisture	47·00	7·97	...
Organic Matter	50·37	84·67	...
(Nitrogen)	0·876	2·285	...
Potash	1·11	2·025	62·47
Lime	0·18	0·16	6·29
Phosphoric Acid	0·17	0·37	13·29
Silica	0·08	...	0·54
Soda	0·05	0·065	1·64
Magnesia	0·12	0·36	9·67
Oxide of Iron	0·06	0·055	0·65

In these analyses it will be noticed that Potash is a dominant factor in the mineral constituents of the coffee bean. This is prominently brought out in the ash analysis (c) where there is more Potash than anything else. This being so it is only logical to suppose that a fertiliser containing a preponderance of Potash should help the coffee tree to ripen up and hold its crop, and the question at once suggests itself, when should this Potash be supplied; do the coffee berries need it from the very beginning of their existence as berries, that is as soon as they have set and the blossom has fallen, or do they need it only towards the end of their development? The same question applies also to the Nitrogen and Phosphoric Acid. It seemed to us that if an answer could be found to these questions it would have a profound practical bearing upon coffee manuring.

In order to attempt to find an answer we conceived the idea of analysing the berries each month throughout their period of development from the time they were quite small to the time when they were ripe and ready to pick. From July 1912 to January 1913 samples were carefully gathered by one of us and these were at once analysed in the laboratory at Bangalore. The results of these analyses are shown in the following tables:—

TABLE II.

ANALYSES OF FRESH COFFEE BERRIES FROM JULY TO JANUARY.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Moisture	87·13	84·45	80·75	71·54	66·06	65·77	66·62
Organic Matter ...	11·96	14·67	18·16	26·93	32·05	32·48	31·58
Ash — Silica ...	0·04	0·01	0·03	0·02	0·02	0·04	0·05
Ash — Phosphoric Acid...	0·08	0·07	0·09	0·16	0·15	0·12	0·12
Ash — Potash ...	0·37	0·43	0·49	0·77	0·93	0·88	0·96
Ash — Lime	0·04	0·02	0·02	0·02	0·04	0·02	0·02
Ash — Other Mineral Matter	0·38	0·35	0·44	0·56	0·75	0·69	0·65
	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Containing Nitrogen ...	0·30	0·38	0·24	0·50	0·61	0·67	0·66

TABLE III.

ANALYSES OF THE ASH OF COFFEE BERRIES FROM JULY TO JANUARY.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Silica	4·48	1·48	2·84	1·23	1·11	2·47	3·03
Phosphoric Acid ...	8·48	8·04	8·20	8·40	7·87	6·56	6·86
Potash	40·31	48·38	45·78	50·30	49·40	50·10	53·19
Lime	4·27	2·04	1·89	1·17	1·89	1·23	1·14
Other Mineral Matter ...	42·46	40·06	41·29	38·90	39·73	39·64	35·81
	100·00	100·00	100·00	100·00	100·00	100·00	100·00

The first table shows the actual composition of the fresh berries as regards the constituents named, while the second table shows the composition of the ash, that is the mineral part, in each sample, it being chiefly this mineral matter with which we are at present concerned. In July the berries were very small and it required 72 of them to weigh one ounce. In January the berries were ripe and the last column in each table is the analysis of the ripe cherries as picked for pulping.

In considering these analyses several factors may be discussed. The first is the moisture content of the berries. It will be noticed that this steadily decreases as the berries increase in size and age, until it reaches a minimum as they near ripeness. Evidently then this is an important factor in the well being of the crop. It is a factor which is influenced not only by the rainfall, but also by cultivation; the physical condition of the soil; the shade, its amount and nature; and by the amount of mulch. Undoubtedly every year a certain amount of crop falls off and this is to a certain extent natural, but there are cases when the trees fail to hold their crop late in the season, and it is possible that the moisture factor has some bearing upon this.

The relation of the physical condition of the soil to its moisture content was discussed by one of us in a paper in the *Planters' Chronicle* (Vol. VII, p. 619,) in connection with a peculiar condition of the coffee on some estates in which the berries and young shoots dry up, and a light post-monsoon dig was recommended for certain types of soils. The present investigation suggests a possible fruitful side line of research which we would commend to the Scientific Assistants, namely the study of the physical condition of different types of coffee soils and their moisture content at different times of the year in relation to the ability of the coffee grown on them to hold a big crop.

With regard to the mineral constituents of the berries there appears to be a markedly steady increase of Potash content throughout the period of growth, and from this we conclude that Potash in an available form is needed all the time.

The Phosphoric Acid content appears to be a constant quantity at first with a maximum about October, after which it declines. Hence it seems likely that this constituent is needed in an available form chiefly in the beginning of the season.

The Nitrogen content increases steadily throughout the period of growth and keeps pace with the increase in organic matter.

The work is admittedly incomplete, and this paper is only in the nature of a progress report, since we know nothing of the composition of the tree itself from month to month throughout a growing period and the amount of plant food needed to develop its wood and leaves and blossom.

It is fully recognised that any conclusions drawn from this work must be largely theoretical, but the figures laid before you are facts. Any recommendations made by us based on the results of this work will be tested in the field by actual experiments with coffee of known history and only when the results of these field experiments are obtained shall we be able to come to you with any definite advice. Field work of this kind however takes a considerable time, and we thought that in the meanwhile you might be interested to know what we were doing and how much progress had been made.

So much for the figures, and here my part of this paper as a chemist may well conclude. I shall now leave it to my collaborator to interpret these

results as a practical planter and point out to you where they have a practical bearing on the manuring of coffee, if they have one at all.

PART II.

In table III before you, you have the results of the monthly analyses of coffee berries made by my collaborateur and expressed, as is usual, in percentages of the various constituents. In my part of this paper the same results will be laid before you but in a different form, one which I hope will appeal to you as practical men.

I intend speaking of pounds and acres instead of decimals and percentages. An acre of coffee, bearing at the rate of 5 cwt. an acre may be taken to exemplify my figures.

The berries on the acre, (bearing at the rate of 5 cwt., or in other words carrying a crop that after drying and curing will yield 5 cwt. of marketable coffee beans), when ripe, weigh roughly 3,000 lbs. and number about 960,000. I arrive at the first figure from the generally accepted ratio of 200, sixty pound bushels or 150, eighty pound boxes equal one ton of dry marketable coffee, and the second figure by calculation from the actual number of ripe berries which weighed one ounce.

It is interesting to trace the history of this weight of berries and see what may be learnt of the migration of plant food from the plant into the berry and what light is thrown on the problem of manuring coffee.

In June when the berries were so small as to be picked with difficulty, the blossom being a late one, the total weight of the berries on the acre taken for illustration was only 155 lbs.

In July the weight increased to 833 lbs. In August it had further increased to 2,143 lbs. In September no increase was apparent as the number of berries to the ounce was the same as in August. In October the weight of berries had reached 2,500 lbs. and attained its maximum in November *i.e.*, 4,285 lbs. and then begins to decrease as ripening progresses till we reach the weight of 3,000 lbs. for all ripe berries in December—January. All these weights have been calculated from the actual number of berries which went to the ounce in the respective months.

The only figure I ask provisional assent to is 3,000 lbs. of ripe, equals 5 cwt. clean dry. By applying the results of my collaborateur's analyses to these monthly weights we can readily calculate the amount of plant food locked up in the berries at different periods of their growth. This has been done and Table IV is the result.

TABLE IV.

Showing amount of plant food in the berries on an acre of Coffee, (bearing at the rate of 5 cwt. an acre) in the months July to January in pounds.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Phosphoric Acic ...	0'66	1'50	1'92	4'00	6'42	3'60	3'60
Potash	3'08	9'21	10'50	19'25	39'85	26'40	28'80
Nitrogen	2'49	8'14	5'14	12'5	26'13	20'10	19'80

The figures shown in the table have been got by calculation from my collaborateur's monthly analyses and the monthly weights submitted above.

From table IV it will be seen that the Phosphoric Acid increases from only 0'66 of a pound total in July to a maximum of 6'42 lbs. on the acre of which we are speaking, in November.

The Potash also reaches a maximum in November but it is present in considerable quantity early in the period of growth e. g. in August the berries contained 9'21 lbs. of pure potash.

This remark applies also to Nitrogen. e.g. in November 26'13 lbs. were present, in August 8'14 lbs.

Having learnt this much of the migration of plant food into the berry the next question is what bearing this knowledge has on manuring of coffee. Can an average estate soil meet the calls which are made by the crop for plant food without the help of manure?

We are of the opinion from our experience of the beneficial results attending the judicious use of fertilisers that the answer to this question is in the negative. It should be noted that only the call made by the berries is spoken of in this paper as we are not in a position to guage the demand which the coffee tree itself makes for plant food to mature its wood and leaves and make its normal growth. We may reasonably infer though, that the total demand is very considerably more than that of the berries alone,

If a soil is unable to supply the necessary amounts of plant food—dying back of wood, falling off of crop, general shuckness and unhealthy appearance are only what we might reasonably expect. We are not concerned in this paper with different forms of fertilisers, except in as much as the plant food contained in them is readily available or not.

It would appear from table IV that the call for the three kinds of plant food under discussion *i. e.*, Phosphoric Acid, Potash, and Nitrogen comes about August-September and is kept up till after November.

This being so it would seem prudent to make sure that they are ready in the soil when wanted

What is the proper season to apply fertilizers to coffee to enable the trees to meet the calls which we see from table IV are made by the berry? Nitrogen, Potash, and Phosphoric Acid may be considered separately.

Nitrogen.—Nitrates are liable to be washed out of the soil so it would seem that Nitrogen should be put in in 2 doses, one before and one after monsoon. Here we touch the work which has been done on mulch and reported in *Planters' Chronicle*, Vol. VII. 15 & 16. It was there pointed out that the natural mulch supplied considerable quantities of Nitrogen. In view of this supply from the natural mulch and of the probability of considerable amount of nitrates being formed in the hot weather and bearing in mind that normal coffee does not show want of Nitrogen in May—June we are of the opinion that there is a possibility of the before-monsoon application of Nitrogen proving unnecessary. The after-monsoon application of Nitrogen should supply that ingredient in an available form to enable the plant to meet the demand for Nitrogen which comes in August and following months.

Potash.—Salts of Potash are not liable to leaching out so may well be applied before monsoon, though if found more convenient might usefully be put on half before and half after monsoon.

Phosphoric Acid.—It very much depends on whether the Phosphoric Acid is in an avaible form or not when it should be applied. A Phosphatic fertiliser with its Phosphoric Acid in an unavailable form applied after monsoon say September—October could not reasonably be expected to supply much of that plant food to the crop then on the trees.

The table shows that the demand of the berries for Phosphoric Acid is not large early in the season, so an after-monsoon application of Phosphoric Acid in an available form might suffice but it would appear safe to apply the Phosphoric Acid in 2 doses, half before monsoon and half after.

Summing up: *Potash* may be applied before monsoon, or half before and half after.

Phosphoric Acid: should be applied half before and half after monsoon; the after monsoon dose to be in an available form,

Nitrogen after monsoon in available form.

Or in other words two applications a year.

One before monsoon of:—

Half the Phosphoric Acid and either half, or all, the Potash and one after the monsoon of:—

Half the the Phosphoric Acid, half the Potash (or no Potash if it has all been applied before monsoon) and the Nitrogen.

In cases where labour or financial considerations preclude two applications a year a compromise might be effected by applying all the Potash, all the Phosphoric Acid in an available, and the Nitrogen also in an available form as soon after the heavy rains as possible. This method, however, we consider far from satisfactory.

These suggestions are based on our present incomplete knowledge of coffee and cannot be taken as final. As my colleague has told you it is proposed to experiment in the field with coffee of known bearing capacity before any definite recommendations are made. It seemed, however, desirable that you should be put in possession of the inferences we draw from the results of the analyses made and the provisional suggestions based on these inferences, particularly so, as these suggestions do not involve any drastic changes in existing methods of manuring. One investigation leads on to another and this again points to the desirability of a third and so on—for instance the work on natural mulch lead to that on Composts and that again to the investigation at present under report. These pieces of work should not be regarded as separate or disjointed, but as links in a chain Science has aptly been defined as an ordered systematic pursuit of knowledge, and a scientific knowledge of coffee can only be attained by continuous and systematic work.

It should be noted that this investigation at present under report could not have been undertaken without a laboratory and I hope that in this piece of work another justification for the existence of the U. P. A. laboratory may be found by those who consider such justification necessary. Before closing my part of this paper I wish to say that during the work on the composition of the coffee berry the desirability of an analytical investigation of the coffee tree itself, root, stem, branches, and twigs has several times forced itself on our notice and is in our opinion a piece of work which should be taken up at no distant date.